

THE COMMON MESH INTERFACE: A STUDY IN COMPUTATIONAL GEOMETRIC ABSTRACTION

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Traditionally, physics modeling codes have been built on computational meshes with geometric limitations (e.g., hexahedral or finite element zoo meshes). We have chosen to implement our physics algorithms in C++ using an approach that is templated on the type of the mesh. We currently have support for arbitrary polyhedral elements, allowing the unstructured mesh to be composed of elements with any number of faces.

The Common Mesh Interface provides the template and inheritance support for enabling our code to run on multiple mesh implementations without changing the algorithmic structure. This is a novel approach in providing the ability for computational scientists to plug and play various computational grids depending upon the requirements of a particular simulation.

This talk provides an overview of the design and software architecture behind the Common Mesh Interface and its role in KULL, a multi-physics simulation code that is currently being developed at Lawrence Livermore National Laboratory.

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